HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Washougal River Coho (On Station Release)
Species or Hatchery Stock	*Oncorhynchus kisutch* Type N Coho
Agency/Operator	Washington Department Fish and Wildlife
Watershed and Region	Washougal/Lower Columbia Province
Date Submitted	nya
Date Last Updated	August 17, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Washougal River Type N Coho

1.2 Species and population (or stock) under propagation, and ESA status.

Type N Coho (Oncorhychus kisutch)

ESA Status: Currently not one of 21 artificial propagation programs proposed for listing (NOAA 69 FR 33101; 6/14/2004). WDFW does not concur with this decision and proposes to operate as an integrated program.

1.3 Responsible organization and individuals.

Name (and title):	Richard Johnson
	Washougal-Skamania Hatcheries Complex Manager
Agency or Tribe:	Washington Department Fish and Wildlife
Address:	600 Capitol Way N. Olympia WA 98501
Telephone:	(360) 837-1020
Fax:	(360) 837-3201
Email:	johnsrej@dfw.wa.gov

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Manager of Mitchell Act Funds

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources
Mitchell Act

Operational Information	Number
Full time equivalent staff	5.0
Annual operating cost (dollars)	$587,000

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Washougal Anadromous Fish Programs and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Washougal Hatchery Type N Coho
Broodstock collection location (stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal
Adult holding location (stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal
Spawning location (stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal
Incubation location (facility name, stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal
Rearing location (facility name, stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal

1.6 Type of program.

Integrated Harvest - (Lower Columbia River)
The proposed integrated strategy for this program is based on WDFW's assessment of the genetic characteristics of the hatchery and local natural population, the current and anticipated productivity of the habitat used by the populations, the potential for successfully implementing an isolated program, and NMFS' proposed listing determination (69 FR 33102; 6/14/2004). Modification of the proposed strategy may occur based upon NMFS' final listing determination and as additional information is collected and analyzed.

1.7 Purpose (Goal) of program.

- Rear and release 500,000 yearling Type N coho into the Washougal River.
- Produce coho salmon to help mitigate for fish losses, including commercial and sport harvest, in the Columbia River Basin for activities within the Columbia River Basin that have decreased salmonid populations including federal dams.
- The goal of this program is to provide harvest of coho in the Washougal River, lower Columbia River/Estuary, and the Pacific Ocean.
- If escapement allows, provide 2.5 million Type N smolts for direct plant into the Klickitat River.
- The program also provides eyed eggs for Clark PUD (70,000) and District. 5 Firefighters (90,000) for multiple RSI sites in Clark County Streams. An additional 12,000 eyed eggs are transferred to the approved list of Region 5 SIC at 500 eggs per project.

1.8 Justification for the program.

- Legal justification includes: Mitchell Act, Pacific Northwest Electric Power Planning and Conservation Act, and U.S. v Oregon court agreements including transfers to the Klickitat system per management plan agreement with the Columbia River tribes.
- WDFW protects listed fish and provides harvest opportunity on Elochoman River coho programs through the Fish Management and Evaluation Plan (FMEP). The objectives of the WDFW's FMEP are based on the WDFW Wild Salmonid Policy. In that policy, it states

that harvest rates will be managed so that 1) spawner abundance levels abundantly utilize available habitat, 2) ensure that the number and distribution of locally adapted spawning populations will not decrease, 3) genetic diversity within populations is maintained or increased, 4) natural ecosystem processes are maintained or restored, and 5) sustainable surplus production above levels needed for abundant utilization of habitat, local adaptation, genetic diversity, and ecosystem processes will be managed to support fishing opportunities (WDFW 1997). In addition, fisheries will be managed to insure adult size, timing, distribution of the migration and spawning populations, and age at maturity are the same between fished and unfished populations. By following this policy, fisheries' impacts to listed steelhead, chinook salmon, coho salmon and chum salmon in the Lower Columbia River (LCR) Evolutionary Significant Unit (ESU) will be managed to promote the recovery of these species and not at rates that jeopardize their survival or recovery.

In order to minimize impact on listed fish by WDFW facilities operation and the Washougal coho program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Washougal coho program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water rights are formalized thru trust water right S2-23896 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (Mitchell Act Intake and Screening Assessment 2002).
Effluent Discharge	4.2	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-1008.
Broodstock Collection & Adult Passage	7.9	Procedures follow protocols that ensure minimal harm to any listed fish that have to be returned to stream.
Disease Transmission	7.9, 10.11	*Fish Health Policy in the Columbia Basin.* Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

1.9 List of program "Performance Standards".

See HGMP Section 1.10

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

1.10.1 Benefits:

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Assure that hatchery operations support Columbia River fish Mgt. Plan *(US v Oregon)*, production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of 1.731% smolt-to-adult survival (range .13% - 4.98%) includes harvest plus escapement. (8655 fish at current production levels)	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity: Maintain effective population size Limit out of basin transfers Maximize available Natural-Origin Broodstock (NOB)	A minimum of 500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return Interim guidelines for basin transfers	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. Adhere to WDFW stock transfer. (WDFW 1991)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (100% adipose-fin clip) for broodstock management and selective fisheries with additional groups Ad+CWT (30,000 –6%) for evaluation purposes	Returning fish are sampled throughout their return for length, sex and marks.
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens/parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens/parasites	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens/parasites	Controls of specific fish pathogens, through eggs/fish movements, are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (17.0 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups)	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, in stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and in stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up-to-date information.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Up to 2300 at a 1:1 male to female ratio if the escapement allows. Broodstock collected supports 500,000 yearling coho for on-station release, provides 220,000 eggs/fish to co-op programs. 2,700,000 eyed eggs if available are used for the Klickitat River out-plant portion. Since 2001, Washougal has been able to meet escapement for this program.

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	500000 FBD	17.0	May 1st on	Washougal River	32.2	Washougal River	Upper/Lower Columbia Gorge

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Indicator	Performance	Source
Smolt to Adult Survival (%)	Return rate from smolt release-to-harvest from 1989 through 1998, indicate an average of 1.731%, with a range of .13% (1992) – 4.98% (1998). Also for: 1999 (1.31%), 2000 (3.19%) and 2001 (2.62%) at a consistent 500k release for these 3 years of release.	WDFW Escapement Reports + Catch records.
Escapement levels	The program escapement goal is 1200 adults. Yearly escapement from 1990 thru 2001 has ranged from 532 (1993) – 3639 (1992) (avg. 1,926 yearly). Data excludes jacks.	WDFW Escapement Reports + Catch records.
Adult production levels	Adult production from 1991-1997 has ranged from 906 (1994) – 10531 (1991) (avg. 3,429 yearly). At consistent 500k releases starting in 1999 the average thru 2001 has been 12,247 fish.	WDFW Escapement Reports + Catch records.

1.13 Date program started (years in operation), or is expected to start.

The first year of operation for this program was 1985.

1.14 Expected duration of program.

The program is on going with no planned termination.

1.15 Watersheds targeted by program.

Washougal/Lower Columbia Province

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview of Key Issues

Coho in the Washougal River are collected at a weir at the Washougal Hatchery (RM 19.7). The hatchery is located above barrier (falls) that has historically limited the passage of fall chinook. WDFW goal is to operate hatcheries to provide harvest opportunity consistent with the recovery of ESA listed populations and/or use hatcheries to reduce extinction risk or assist in recovery of listed populations.

1.16.2 Potential Alternatives to the Current Program

Alternative 1: Develop broodstock collection and juvenile release facility at Salmon Falls Fishway. A trap at Salmon Falls would facilitate the change to an integrated program for all hatchery steelhead and salmon populations in the watershed. This would allow WDFW to switch to native steelhead broodstock and allow for the broodstock collection needs in chinook and coho programs. This would increase natural spawning by chinook in areas where they historically existed. A trap would create a wild steelhead sanctuary where no hatchery produced fish would be allowed, thereby preserving their genetic integrity. Inter and intra species competition, disease transfer, residualism, and crossbreeding, would be reduced or eliminated.
Alternative 2: Include a mix of wild coho in the production, this would integrate the population.
Alternative 3: Utilize surplus adult coho to seed historical coho habitat in the watershed.
Alternative 4: Move coho production for Klickitat tribal mitigation to the Klickitat River

Hatchery.
Alternative 5: Eliminate coho program entirely and replace with late stock of chinook from Lewis. Close Skamania hatchery, construct trap at Salmon Falls, convert steelhead program to integrated broodstock with hatchery production changed during high abundance cycles. Construct acclimation facility at lower river gravel quarries at RM 1.5 to acclimate all hatchery produced steelhead and significant numbers of tule chinook. This alternative would be the ideal situation for the Washougal watersheds' ESA listed fish, its sport fishermen and the citizens in the watershed.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: Develop acclimation sites lower in the watershed to promote increased natural spawning by coho.

Reform/Investment 2: The Intake and Passage Report indicates that the screens and passage are not in compliance with current standards. We recommend the capitol projects for compliance be invested in to provide future programmatic adaptive management strategies that will protect listed fish as well as integrate hatchery programs.

Reform/Investment 3**:** Coded-wire-tagging and recovery programs must be sufficiently funded to meet the current management and science needs. Measures of spawning escapement including the proportion of hatchery and wild spawners must be accurate and precise and population estimates should include confidence intervals.

Reform/Investment 4: The trap and handle facility has several issues related to unsafe handling of adult listed fish. A complete investigation and comprehensive re-design is needed to accommodate a facility that can be installed and removed without putting machinery in the stream, as well as a trap facility that will sort, return to the stream, and/or load fish with a water to water transfer method to cause no harm to hatchery or wild stocks. Sorting and handling, in general, is very hard on adult fish and routinely causes mortality. This can be prevented with a modern semi-automated sorting and handling system. This sorting system would be comprised of an initial holding pond that would collect and hold the fish until sorting is initiated by opening a gate, which allows adults to be attracted through a false weir and onto a fabricated, sloped, sorting chute. The chute contains paddles and side chutes. The side chutes lead to different adult ponds and also provides returns to the river above and below the in-stream barrier. An observer located in a control tower above the main chute identifies the fish as it enters the chute and then activates the paddles to direct the fish to the desired location. Staff does not physically handle the fish during this sorting process.

Reform/Investment 5: Mitchell Act funding has not kept up with fish production programs or monitoring and evaluation needs for many years. As a result, two of the eight WDFW Mitchell Act hatcheries are closed, overall fish production is 14% lower than the average for the past 24 year period, and the needs for adequate monitoring and evaluation continues to escalate with ESA requirements. Additive to this growing problem is the facilities aging infrastructure. In the area of compliance, we find it very difficult to continue programs with a high level of confidence and still sustain ESA compliance in the screening, adult handling, and passage areas. The solution to many of the existing problems is Capitol and Operations budgets that will meet the deficiency's we describe in this process.

Reform/Investment 6: To use Salmon Falls Fishway as a trap, extensive modifications will need to be made and funds will be needed to operate the trap. Two designs have been suggested: 1) A wire strung above the 500 year flood elevation, bolted into the bedrock on either side. A curtain of weighted stringers would lie over the upstream side of the falls to block jumping fish. 2) A wood or steel lip or platform extending out over the face of the falls would look more natural from a distance, reducing potential complaints.

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

Program is described in the "Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service" (March 99). Also statewide Section 6 consultation with USFWS for interactions with Bull Trout. During 2004 WDFW is writing HGMP's to cover all stock/programs produced at Washougal including; Columbia River chum, fall chinook, coho, summer and winter run steelhead.

2.2 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Fall Chinook	H	H
Chum- Natural	M	L
Summer Steelhead	H	H
Late Winter Steelhead-Natural	H	H
Coho- Natural and Hatchery (Proposed)	Na	Na
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be directly affected by the program.

Lower Columbia River Coho (*Oncorhynchus kisutch*) has been proposed for listing as "threatened" on June 14, 2004.

Identify the ESA-listed population(s) that may be incidentally affected by the program.

Columbia River chum salmon *(Oncorhynchus keta*) - Mainstem chum were listed as "threatened" under the ESA on March 25, 1999.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytscha*) are federally listed as "threatened" under the Endangered Species Act.

Lower Columbia River steelhead *(Oncorhynchus mykiss*) were listed as "threatened" under the ESA on March 19, 1998.

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Describe the status of the listed natural population (s) relative to "critical" and "viable" population thresholds.

Critical and viable population thresholds have not been established for these ESUs and the populations within them. NMFS has formed a Lower Columbia River/Willamette River Technical Review Team to review population status within these ESUs and develop critical and viable population thresholds.

Lower Columbia River Coho (*Oncorhynchus kisutch*) has been proposed for listing as "threatened" on June 14, 2004.

Status: NMFS concludes that the LCR coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers. Twenty-one artificial propagation programs are considered to be part of the ESU as NMFS has determined that these artificially propagated stocks are genetically no more than moderately divergent from the natural populations. Currently the Washougal N coho program is not one of the 21 artificial propagation programs proposed for listing (NOAA 69 FR 33101; 6/14/2004).

Washougal River wild coho run is a fraction of its historical size. In 1949, it was estimated that the Washougal had spawning area for 6,000 pair of salmon; 5,000 below Salmon Falls and 1,000 between Salmon and Dougan Falls. In 1951, WDF estimated coho escapement to the basin to be 3,000 fish. Hatchery production accounts for most coho returning to the Washougal River while natural coho production is presumed to be very low. Natural coho production is limited to lower river tributaries downstream of Dougan Falls and has persisted at low levels in the Little Washougal River. Coho have been planted in the Washougal basin since 1958 with extensive hatchery coho releases having occurred since 1967. Current program rears 2.5 million late coho but only releases 0.5 million into the Washougal River; the remaining 2 million are released into the Klickitat River as per a management plan agreement with the Columbia River tribes.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999. In Washington, the LCR chinook ESU includes all naturally spawned chinook populations from the mouth of the Columbia River to the Cascade Crest.

Native fall chinook have been reported in the Washougal, but a distinct stock no longer exists. The Washougal River fall chinook natural spawners are a mixed stock of composite production. Natural spawning does occur, but these fish are identified as hatchery strays and there are no natural spawning escapement goals. Washougal River fall chinook spawn in the area from Salmon Falls (RM 14.5) downstream approximately 4.0 miles. Natural spawning occurs in the Washougal River slightly later (October to November) than other lower Columbia River tule fall chinook stocks. Natural escapement is estimated using spawning ground counts within selected index areas. Natural spawn escapements from 1967-1991 averaged 1,832 with a low return of 70 in 1969 and a peak return of 4,578 in 1989. Since 1971, the annual natural escapement has averaged 2,157 fish. SaSI (2002) listed the Washougal River fall chinook natural spawn stock status as "healthy" based on escapement trend. Although final escapement objectives have not been established by the NMFS through a recovery plan, WDFW (2003) has established **interim** minimum escapement objectives. The minimum fall chinook MSY escapement goal is 3,000 adult spawners from the mouth of the Washougal River to the Washougal Salmon Hatchery.

Table 2. Fall chinook salmon abundance estimates in the LCMA (FMEP 2003)

Year	Cowee-man River	Cowltiz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River	Wind River Bright	Wind River Tule
1990	241	2,698	123		20,54	342	17,506	2,062	177	11
1991	174	2,567	123	33	5,085	230	9,066	3,494	269	52
1992	424	2,489	150		3,593	202	6,307	2,164	51	54
1993	327	2,218	281	3	1,941	156	7,025	3,836	686	0
1994	525	2,512	516	0	2,020	395	9,939	3,625	1,101	11
1995	774	2,231	375	30	3,044	200	9,718	2,969	278	4
1996	2,148	1,602	667	351	10,630	167	14,166	2,821	58	166
1997	1,328	2,710	560		3,539	307	8,670	4,529	220	148
1998	144	2,108	1,287	66	4,318	104	5,929	2,971	953	202
1999	93	997	678	42	2,617	217	3,184	3,105	46	126
2000	126	2,700	852	27	1,420	323	9,820	2,088	25	14
2001	646	5,013	4,951	132	3,714	530	15,000	3,901	217	444
2002	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na

Columbia River chum salmon (Mainstem Chum) ***(Oncorhychus. keta*****)** Columbia River chum salmon were listed as "threatened" under the ESA on March 24, 1999.

Status: Historically, chum salmon were abundant in lower portions of the Columbia River and supported annual harvests of hundreds of thousands of fish. Currently, relative abundance of chum salmon is likely less than one percent of historical levels and spawning is known to occur in only three streams (Hardy Creek, Hamilton Creek, and Grays River). Spawner surveys of chum salmon in three streams indicated that a few thousand to 10,000 chum salmon spawn each year in the Columbia River Basin. In the Columbia River ESU, chum salmon from the Cowlitz River Hatchery Program are considered part of the ESU. It is believed that these chum populations have been influenced by hatchery programs and/or introduced stocks. The factors for decline in naturally reproducing chum salmon populations are primarily attributed to habitat degradation, water diversions, harvest, dams, loss of estuarine habitats, and artificial propagation. Presently, there are no recreational or commercial fisheries for chum salmon in the Columbia River although some fish are incidentally taken in the gill-net fisheries for coho and chinook salmon. As chum emerge in mid March and spend less time in freshwater, the migration window for chum migration is believed to be complete by early May prior to the Washougal program coho releases from mid-April-May. There have been a few historical records of chum salmon in the mainstem Washougal River. However, recent surveys were conducted primarily for fall chinook coded wire tag recoveries and upstream of typical chum spawning areas. They were not conducted during chum spawning times or at downriver spawning locations. In 1998, WDFW performed limited non-index spawning ground surveys and found one chum in the Washougal. In 2000, BPA funded PSMFC to conduct more intensive non-index surveys. One chum was found in Lacamas Creek, a downstream tributary (RM 0.8) of the Washougal in 2000.

Table 3. Peak spawning ground counts for chum salmon in index reaches in the LCMA (M Groesbeck WDFW; Streamnet).

Fall Chum Return Year	Grays River				Hamilton Creek			Hardy Creek
	Mainstem	West Fork	Crazy Johnson Creek	Total	Spawning Channels		Total	
					Hamilton	Spring		
1990	569	0	117	686	35	16	51	192
1991	327	37	239	603	8	11	19	206
1992	3,881	491	374	4,746	141	8	149	1,153
1993	2,334	113	91	2,538	16	4	20	395
1994	42	0	105	147	47	22	69	435
1995	219	0	483	702	4	16	20	214
1996	1,302	408	463	2,173	5	81	86	273
1997	79	55	485	619	31	114	145	105
1998	154	214	145	513	43	237	280	443
1999	222	100	927	1,249	17	165	182	157
2001	1,124	833	249	2,206	56	143	199	20
2002	448	1,630	1,260	3,338	226	462	688	498

Lower Columbia River steelhead *(Oncorhynchus mykiss)* were listed as "threatened" under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River.

Status of summer and winter runs: There is strong concern about the pervasive influence of hatchery stocks within the ESU. There is no tribal or direct commercial fishery on steelhead although incidental catch of wild steelhead may occur in the lower Columbia River fall gill-net fishery. Winter steelhead are distributed in the mainstem Washougal, the Little Washougal and various tributaries within the Washougal sub-basin. Generally, Dougan Falls (RM 21.6) is considered the upstream extent of winter steelhead distribution in the mainstem Washougal. Winter steelhead also move well into the headwaters of the Little Washougal watershed. Accurate run size and harvest estimates of wild winter steelhead do not exist. The SASSI stock status of winter steelhead in the Washougal River was "unknown" in 1992. The LCSCI stock status update in 1998 listed the stock as "depressed" based on a short-term severe decline. The SaSI spawner escapement goal was 841 wild winter steelhead for the Washougal mainstem. This escapement goal for wild winter steelhead was lowered to 541 fish with the LCSCI update. Returns of winter steelhead have been only 28% of the escapement goals for the Washougal, and returns of summer steelhead have been <40% of the escapement goals.

Timing of adult migration most likely occurs January through May, with peak movement in March. The Skamania Hatchery is located on the lower end of the North Fork Washougal and has been stocking hatchery steelhead into the river system since 1957. Approximately 60,000 hatchery winter steelhead smolts are released annually in the Washougal River. These smolts are Skamania origin steelhead, reared primarily at the Skamania Hatchery on the Washougal, but also at the Vancouver and Beaver Creek facilities. Interbreeding between hatchery and wild steelhead is thought to be very low because of the run timing. Wild summer steelhead in the mainstem Washougal River and tributaries are a native distinct stock based on the geographical isolation of the spawning population. Similar to other wild summer steelhead stocks in the lower Columbia River area, run timing is generally from May through November and spawn-timing is generally from early March to early June. Limited spawner surveys and snorkel surveys of summering

adults indicated low numbers of adult steelhead but not enough data was available at the time to assess the status of the stock. In a more recent study, the steelhead stock was determined to be "depressed" due to chronically low escapement measures taken between 1952 and 1997.

Table 4. Wild winter steelhead abundance estimates in the LCMA (FMEP 2003).

Brood Year	Index Redd Surveys					Pop. Est. Trap Counts		IndexTrap/redd
	Coweeman	SF Toutle	Green	EF Lewis	Washougal	NF Toutle	Kalama	Cedar Creek
1990	522	752	86	102		36	419	
1991		904	108	72	114	108	1,128	
1992		1,290	44	88	142	322	2,322	
1993	438	1,242	84	90	118	165	992	
1994	362	632	128	78	158	90	853	
1995	252	396	174	53	206	175	1,212	
1996	44	150				251	853	70
1997	108	388		192	92	183	537	78
1998	314	374	118	250	195	149	438	38
1999	126	562	72	276	294	129	562	52
2000	290	490	124	207	939	238	941	
2001	284	334	192	79	216	185	1085	
2002	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na

Table 5. Wild summer steelhead abundance estimates in the LCMA (FMEP 2003).

Brood Year	Pop Est Trap	Snorkel Surveys			Index/Redds
	Kalama	EF Lewis	Washougal	Wind	Wind
1990	745		156	116	228
1991	704		31	123	294
1992	1,075		77	129	287
1993	2,283		71	101	
1994	1,041		49	104	
1995	1,302		70	136	84
1996	614	85	44	96	
1997	598	93	57	106	106
1998	205	61	112	44	
1999	220	60	115	43	96
2000	140	99	118	26	
2001	329	117	145		
2002	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Describe hatchery activities: The following activities listed below are identified as general hatchery actions that are identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999).

Broodstock Program:

Broodstock Collection: During coho trapping, the Washougal hatchery could also collect listed

chinook and steelhead. Staff can quickly distinguish wild steelhead with adipose fin and transport fish back to an approved upstream site as indicated by Region 5 staff. Listed chum are not seen this high up in the system. But, currently listed chinook cannot be identified in the Washougal fall chinook program since hatchery-origin fish are not 100% marked. See also take Tables at the end of this document. .

Genetic introgression: Both early and late coho stocks are probably represented on the spawning grounds in the Washougal River today. Type-N coho enter the Columbia River by mid-October and begin entering tributary streams in early November. Spawning activity peaks between late November and late December. All adults recruited for use as broodstock have been of hatchery origin since brood year 1999. WDFW believes that there are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin. For the proposed integrated program, non-local coho stock transfers into this system will be limited as much as possible. WDFW is proposing to maximize the available natural fish into the broodstock for 2004. Stray rates are unknown at this time. Indirect take due to genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Washougal Hatchery withdraws water from the river at two locations; one is at the hatchery intake while another intake is situated 0.5 miles upstream. This can further reduce low flows in late summer and early fall from the sections between the intake to where the non-consumptive water rejoins the river (a distance of ½ mile) (Mitchell Act Hatcheries Intake and Passage Study -April 2003). Water withdrawal is permitted, intake and screening compliance has been assessed and solutions identified. Hatchery effluent discharges fall within NPDES guidelines. Indirect take for hatchery operations is unknown.

Disease: Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Washougal Hatchery. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) chapter 5 have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish. In addition, although pathogens may cause post release mortality in fish from hatcheries, there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986; Steward and Bjornn 1990). Prior to release, the steelhead population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease.

Release Program:

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. Washougal Type N coho releases since 1998 have remained consistent at the current levels. They are mass marked to provide intensive select fisheries and provide protection for listed fish. Volitional releases of the Washougal coho program spread the release impact out over a couple of weeks allowing fish to vacate the immediate area. Indirect take from genetic introgression is unknown.

Competition: Salmon and steelhead feed actively during their downstream migration (Becker 1973; Muir and Emmelt 1988; Sager and Glova 1988) and if they do not migrate they can compete with wild fish. WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

1) As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids." On station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1999).
2) NMFS (2002) noted that "..where inter-specific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates."
3) Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource". Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment."
4) Fresh (1997) noted that "Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results."
5) Studies by Fuss et al. (2000) on the Elochoman River and Riley (2004) on two Willapa Bay tributaries (Nemah and Forks) indicate that hatchery reared coho and chinook can effectively leave the systems within days or weeks.

Predation (Freshwater): Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. We have provided in this section a summary of empirical information and theoretical analysis of competition and predation interactions that may be relevant to the Washougal coho program.

Predation Risk Factors:

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG (1984) for a review) with risk greatest in small systems during periods of low flow and high clarity. The Washougal watershed is a large river with historical flows ranging from a high of 40,000 cubic feet per second (cfs) to a low of 70 cfs. From mid March until late April, flows averaging approximately 1,000 cfs can drop approximately 50% to 500 cfs by mid May (DOE 2002). Releasing active smolts during spring river freshets (mid-April to early May) combined with observed smolt behavior is an important

release consideration. Inter-species density related impacts could be greater toward mid May and later as river flows could be only 50 % of observed flows in mid April.

Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2001). The "33% of body length" criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" until further data for this system can be collected.

Dates of Releases: The release date can influence the likelihood that listed species are encountered. There are limited studies on migration timing of naturally produced chinook but listed chinook from the Lower Columbia ESU are believed to emigrate from March through August. Coho programs in the Lower Columbia have been implementing later release dates (on or after May 1) which allows listed fish additional time for growth. Although staff considers size, smolt condition and environmental conditions to determine the most optimal and safest release date for the program, yearling programs close to release times are at the mercy of environmental conditions, and unforeseen problems such as high temperatures or unusual low water conditions.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time fish co-mingle. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate.

When discussing predation by mostly yearling fish (both hatchery and wild) the magnitude of predation will depend upon the characteristic of the population, the habitat in which the population occurs, overall food availability (besides fish) and the characteristics of the hatchery program (e.g., release time, release location, number released, and size of fish released). We have provided a summary of empirical information and theoretical analysis of competition and predation interactions that may be relevant to the Washougal coho program.

Potential Washougal coho predation and competition effects on listed salmonids: The proposed annual production goal for this program is 500,000 fish which has been a consistent level since 1998. Washougal coho programs start volitional releases in late April to May 1st. This window of release could encounter listed fish (emerging chinook, steelhead and chum) in the Washougal sub-basin and Columbia mainstem. Coho will be now targeted for release at 17 fpp (131 mm fl). Yearling hatchery coho smolts would not likely compete for food or habitat with fingerling stocks of chinook or steelhead in regards to food and habitat (Section 7). At 17 fpp (131 mm fl), coho pose an unknown risk on listed chinook less than 43 mm fl. Below are some data available for chinook fry and fingerling lengths from area Lower Columbia streams. The magnitude of predation will depend upon the characteristic of the listed population of salmonids and the habitat

in which the population occurs.

Below are some of the data that is available for chinook fry and fingerling lengths from area Lower Columbia streams:

- Lengths from the Lewis River system during the month of June indicate fish 48-55 mm fl (Columbia River Progress Report 2003-16). The Lewis River system fall chinook stock timing though is the latest for the Columbia tributary stocks, and considered to be the worst case scenario (smaller size) when compared to other Columbia River systems.
- Abernathy Creek (WRIA 25) indicated lengths of 36mm – 40mm from March to April 1 (Pat Hanratty, WDFW, pers comm. 2004).
- Average fork length, by week from 26 sampling sites on the Kalama River, indicate fish 44 mm fl (April 25), 46 mm fl (May 3), 56 mm fl (May 11) and 62 mm fl (May 16). Other lengths through August are available (R. Pettit WDFW, pers. comm.).
- Fork lengths from Cedar Creek (tributary to the N.F. Lewis River) indicate that average chinook lengths reach approximately 50 mm fl between the weeks of April 12 and April 19, 2004, and are growing rapidly with fish 55-60 mm fl by April 26 and May 3, 2004.

For chum impact, mean lengths from the Grays River Hatchery and Sea Resources (Chinook River) Chum Recovery programs indicate chum releases are: 56.2 – 58.8 mm fl (in mid-March), 55.2 mm fl (late March), and 54.6 mm fl in mid-April (Lower Columbia Chum HGMP 2004). For the Duncan Creek and Ives Island Chum Recovery programs, fish are released at 1.0-1.5 grams or 50-55 mm fl on a staggered basis from mid-March through May (Bonneville Population of Columbia River Chum Salmon HGMP 2004). Additionally, 95% of the chum emigration was completed by May 1 (2003) and by April 22 (2004).

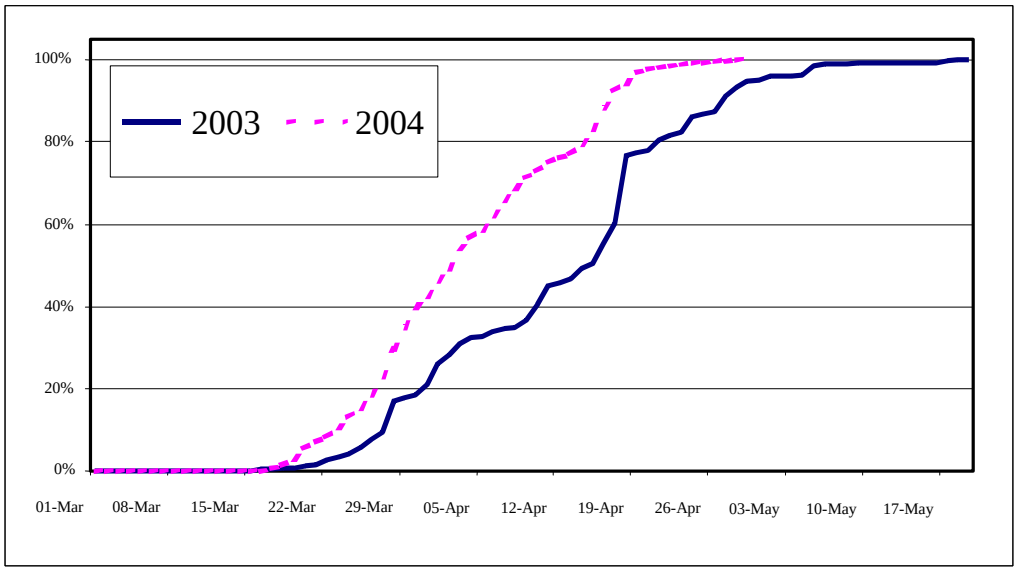

Figure 1. Chum salmon out migration timing at Duncan Creek for Brood Year 2002 & 2003.

Impact for listed steelhead is unknown but spawning time for wild winter steelhead stocks in the ESU occurs from March to May with April 20th the peak week of spawning and depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates listed fish not available until late May to mid June (LCSI Draft 1998). Summer steelhead are approximately a month earlier. Indirect take from this

potential predation is unknown.

Table 6. Steelhead Spawn and Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25th	May 13 – June 15	May 27- July 7	June 17	LCSI Draft 1998
Summer	February April	March 20-30th.	April 14 – May 18	April 28 – June 2	May 15	Kalama River Research Report 2003

Listed coho (proposed):
Current lengths and data for listed coho in the Lower Columbia ESU is unknown. Depending on water temperatures, hatchery coho fry during the month of April can range from 42 – 40 mm fl and be 50 mm fl by the first of May (Washougal coho growth data 2004).

Indirect take from predation and competition is unknown.

Residualism: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) are measured through out the rearing cycle and at release.
- Feeding rates and regimes through out the rearing cycle are programmed to satiation feeding to minimize out of size fish and programmed for smolt phase as release or plant times approach.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating with in a couple of days.
- Minimal residualism from WDFW coho programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss 2000).

Indirect take due to residualism is unknown.

Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the main stem, Witty et al. (1995) concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates with Durkin (1982) reporting that diet of coho smolts (128-138 mm fl) in the Columbia River estuary was composed almost entirely of invertebrates without evidence of salmonids as prey (HSRG 2004). There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

Monitoring:

Associated monitoring Activities: The following monitoring baseline activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are

conducted for winter steelhead in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring chinook. Mark-recapture surveys provide data for summer steelhead populations in the Wind and Kalama rivers. Mark-recapture carcass surveys are conducted to estimate populations of chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, EF Lewis rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations. Snorkel surveys are conducted for summer steelhead in the EF Lewis and Washougal rivers. Trap Counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek, a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis, and Wind rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. (See Take Tables at the end of this document for identified levels).

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Any additional mortality from this operation on a yearly basis would be communicated to WDFW Fish Program staff for additional guidance. For other listed species, if significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA Fisheries for adaptive management review and protocol.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
No data available

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

For ESU-wide hatchery plans, the production of coho salmon from Washougal Hatchery is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin
- 1999 Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994)
- The *U.S. v. Oregon* Columbia River Fish Management Plan
- The *U.S. v. Oregon* Columbia River Fish Management Plan for coho plants to the Klickitat system.
- NWPPC Fish and Wildlife Program

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations with which the production of coho salmon from Washougal River Hatchery is consistent with the following WDFW Policies*:*

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations.. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

Stock Transfer Guidelines. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Policy Chapter 5, IHOT 1995).

National Pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan (CRFMP)
- U.S. vs. Oregon court decision
- U.S. vs. Oregon court decision for Klickitat Production
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife (WDFW) Wild Salmonid Policy
- WDFW Yearly Future Brood Document (FBD)
- Lower Columbia Fisheries Management and Evaluation Plan (2003 FMEP)

3.3 Relationship to harvest objectives.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

WDFW has received authorization for tributary, Columbia River mainstem, and ocean fisheries. The combined harvest rates in the Fisheries Management and Evaluation Plan (FMEP), Columbia River Fish Management Plan (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process to ensure the harvest rates are consistent with recovery of listed species in the target area.

U.S. v. Oregon/Columbia River Compact

U.S. v. Oregon/Columbia River Compact fisheries Technical Advisory Committee impact assessments are evaluated through the Section 7/10 consultation process. The commercial fishery seasons on the portion of the mainstem Columbia River where the states of Oregon and Washington share a common boundary are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact). The ODFW and WDFW directors or their delegates comprise the Compact and act consistent with delegated authority by the respective state commissions. Columbia River seasons are also regulated by the U. S. v. Oregon process which dictates sharing of Columbia River fish runs between treaty Indian and non-Indian fisheries. The Compact receives input from the tribes, states, the federal government, and the fishing industry through a series of meetings held throughout the year. These meetings assist the Compact in developing harvest allocations and decisions related to monitoring harvest quotas. Meetings are held in late January of each year to establish the harvest guidelines for the spring and summer fisheries and in late July to establish guidelines for fall fisheries.

Coho returning to the Columbia River are managed according to two major stocks. The early-returning fish are referred to as the south-turning or S-type fish because they contribute well to the more southern ocean fisheries. They are generally recognized as Toutle River origin fish. The late-returning coho are referred to as north-turning or N-type fish because they contribute more heavily to the northern ocean fisheries. They are generally recognized as Cowlitz origin hatchery fish. Coho production from Washougal shifted from early coho to late coho by the late 1980's. With mass marking, the agency staff has taken steps to identify natural coho stocks and handle

them in a manner that would provide for their survival and reproduction yet maximizing harvest thus limiting hatchery coho on the spawning grounds. Harvest rates for Columbia River coho have averaged 74.2% in the mid 1980s (1985-89). The harvest rates then dropped to 48.8% (1997-98). With strong hatchery returns in the future, in conjunction with mass marking, aggressive harvest rates on hatchery coho might be achieved with minimal take on Washougal River natural coho in the future. Since 1999, returning Columbia River hatchery coho have been mass marked with an adipose fin clip to enable fisheries to selectively harvest hatchery coho and release wild coho. Hatchery coho can contribute significantly to the lower Columbia River gill net fishery. Commercial harvest of early coho in September is constrained by fall chinook and Sandy River coho management; commercial harvest of late coho is focused in October during the peak abundance of hatchery late coho. Naturally produced lower Columbia river coho are beneficiaries of harvest limits aimed at Federal ESA listed Oregon coastal coho and listed Clackamas and Sandy River coho. During 1999-2002, fisheries harvest of ESA listed coho was less than 15% each year. An average of 924 coho (1979-1986) were harvested annually in the Washougal River sport fishery. A special snag fishery for disabled fishermen was present near the hatchery until 1986 to harvest surplus hatchery fish; harvest from 1979-1986 averaged 1,193 coho annually. CWT data analysis of 1995-97 brood Washougal Hatchery late coho indicates 71% were captured in a fishery and 29% were accounted for in escapement. Fishery CWT recoveries of Washougal late coho are distributed between Columbia River (57%), Washington ocean (30%), and Oregon ocean (13%) sampling areas (LCFRB Subbasin Reports Volume II, Chapter 15 Washougal River Subbasin 2004)

Return Year	Total Catch (all ages)
Goal	nya
1990	nya
1991	7040
1992	3245
1993	440
1994	175
1995	nya
1996	391
1997	820
1998	nya
1999	4987
2000	12989
2001	10437

3.4 Relationship to habitat protection and recovery strategies.

Subbasin Planning and the Lower Columbia Fish Recovery Board (LCFRB)

The current Washougal HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Washougal River Sub-basin Summary May 17, 2002 and 2004) is a broad-scale initiative that will provide building blocks of recovery plans by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may well use HGMP alternative ideas on how to utilize hatchery

programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, WDFW Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from the Washougal Complex.

Habitat Treatment and Protection: WDFW is presently conducting or has conducted habitat inventories within the Washougal sub-basin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP) that documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis
A WRIA 28 (Salmon -Washougal Basins) habitat limiting factors analysis (LFA) report has been completed by the Washington State Conservation Commission (G Wade, Jan. 2002). Past natural and anthropogenic disturbances have had significant impacts on habitat conditions within the sub-basin. The Yacolt Burn, forestry practices, splash and hydroelectric dams, road construction, mining, residential and industrial development, water withdrawals, and industrial pollution from paper mills have all altered habitat conditions within the sub-basin. While some habitat conditions have improved over time, other habitat conditions have been much slower to recover from past impacts. Many sections of the mainstem Washougal and its tributaries still lack adequate structural large woody debris (LWD), spawning gravels, and quality pool habitat. Culverts and dams still block passage to critical and very limited tributary habitat. Stream adjacent roads continue to alter riparian function and stream hydrology, and contribute fine sediments to spawning gravels. Water withdrawals continue to limit available spawning and, especially, rearing habitat within the sub-basin. Development continues to reduce critical floodplain and riparian functions.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Washougal coho program and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Washougal coho smolts can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and Orcas.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River

distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program. Multiple programs including fall chinook and Type N coho programs are released from the Washougal Hatchery and limited natural production of chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.). Accept for yearling coho and steelhead, these species may serve as prey items during the emigration through the basin. While not always desired from a production standpoint, these hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species through the watershed, reducing residency. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003). The Washougal River drainage is thought to be inadequately seeded with anadromous fish carcasses and a program has been initiated with the use of volunteers (Lower Columbia Fishery Enhancement Group, Camas Washougal Fish and Habitat League) to distribute coho carcasses when appropriate. Assuming limited non-successful spawning, up to 1,000 adult carcasses could contribute approximately 10,000 pounds of marine derived nutrients to organisms in the Washougal River. *Saprolegniasis* occurrences in young hatchery fish though have been observed in greater frequency on Mitchell Act stations. In some cases, circumstantial evidence suggests more outbreaks of gill and tail fungus are the result of nutrient enhancement efforts. Fish health staff is continuing to monitor observations or occurrences of this possibility.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Washougal coho smolts can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals benefit from migrating smolts (river otters) and returning adults including: harbor seals, sea lions and Orcas.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

Water is supplied from a pumped intake on the Washougal River. Five pumps deliver river water to the hatchery. During lower use periods, the river intake supplies 3,500 gallons per minute (7.8 cfs) in November and December to a maximum 7,500 gpm (16.7 cfs) from March through August. Spring water from Boyles Creek is located approximately 75 yards from the hatchery and supplies 2,300 gpm (5 cfs) non-turbid and minimal silt laden water to the hatchery during high flow river events. Since this is a short stream originating from a spring source, the agency has determined there are no fish populations within this stretch and does not need a screen intake. A gravity intake on Bob's Creek is located 1/3 mile from the grounds and supplies 2.5 cfs for incubation. Due to the steep elevation and grade, the stream is a natural barrier to fish and does not have fish. "C-Creek", another small spring source used in the past, is not used anymore (R. Johnson, pers. comm. 2004).

During summer, water from the river intake reflects elevated temperatures. Water temperature data collected at the Washougal Salmon Hatchery between 1987 and 1991 also documents high water temperatures in the upper Washougal basin. During this 5-year recording period, water temperatures at the hatchery frequently exceeded 17.8°C during July, August and September; in some cases for as long as 17 days in a row.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Hatchery water withdrawal	Water withdrawals are granted under S2-12684. Department of Ecology (DOE) current database can track other associated water rights associated with this facility including multiple surface water sources, or groundwater withdrawals for incubation and/or domestic usage.
Intake/Screening Compliance	Intake structures were designed and constructed to specifications at the time the Washougal facility was constructed. The Mitchell Act Intake and Screening Assessment (2002) has identified design and alternatives needed to get existing structures in compliant including Washougal Hatchery. Intake screens (3/32 inch wide x 11/4 inch long) and velocity sweeps may not be compliant with NOAA fish screening standards. Allowable velocity of 0.40 fps is exceeded and the backup pump is too close to the screen area causing high approach velocities. From the assessment, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system.
Hatchery effluent discharges. (Clean Water Act)	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-1026. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)C*1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)C*1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Broodstock is collected by volitional return to the adult capture pond and are held for up to 30 days in the adult holding pond.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Asphalt Adult Holding Pond	100825	185	109	5.0	11225

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

Adult fish are not transported from station.

5.3 Broodstock holding and spawning facilities.

Coho are collected and held for spawning in the asphalt holding pond. The pond is supplied with 11,225 gallons per minute (gpm) of Washougal River water. Integrated Hatchery Operations Team (IHOT) adult holding guidelines are followed for adult holding, density, water quality and alarm systems. Adults are seined, sorted, killed and spawned directly from the adult holding pond at the kill bin area. Fish not ready to spawn are returned to the pond for further maturation. Spawning for this program takes place in a covered area.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Asphalt Adult Holding Pond	100825	185	109	5.0	11225

5.4 Incubation facilities.

The hatchery building contains 72 double stacks of Heath Stack vertical-flow incubators and 9 deep trough style incubators for the bulk eyeing of eggs. Water source is from Bobs Creek. Standard 1:6000 (1,667 ppm) formalin drip treatments controls fungus on eggs and are administered for 15 minutes, 6 times a week.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Heath Stack Trays (72 unit stacks with 16 trays/stack)	1152	5	nya	nya	10000
Deep Troughs with Cell Baffles (9 cells/Trough)	4	12	nya	100000	nya

5.5 Rearing facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
12	Concrete Raceways	5000	80	20	3.1	265	2.69	0.17
12	Concrete Raceways	8750	135	17.5	3.7	320	2.10	0.068
1	Earth Pond (1.1 acres)	420000	nya	nya	nya	7000	3.66	0.12

5.6 Acclimation/release facilities.

Same, see above.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Program has experienced operational difficulties during drought events, which caused problems in water availability and quality (temperature). In winter, slushing, icing and snow can cause flow interruptions.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Potential Hazard	Risk Aversion Measure
Equipment failure/Water loss	One main river pump is kept specifically for backup purposes in case of mechanical failure. Backup generator system is automatic in case of power loss. Multiple water sources (Boyles and Bob's Creeks) are gravity fed and can be used in case of total power and/or backup generator failure.
Flooding/Water Loss	The facility is sited so as to minimize the risk of catastrophic fish loss from flooding and set up with low water alarm probes in strategic locations to prevent loss due to loss of water. Alarm systems are monitored 24/7 with staff available on-station to respond to problems.
Disease Transmission	IHOT fish health guidelines are followed. WDFW fish health specialists conduct inspections monthly and problems are managed promptly to limit mortality and reduce possible disease transmission.

Section 6. Broodstock Origin and Identity

6.1 Source.

The Washougal Hatchery "Type N" coho broodstock for the on-station release of 500,000 smolts came from the Washougal River from 1987 to present with the exception (1993) when Lewis River stock coho "Type N" were used as a supplement. The use of natural-origin fish (adipose fin present) will be maximized to allow for the integration of this program.

6.2.1 History.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Cowlitz Hatchery Type N Coho	H	1985	U
Washougal Hatchery Type N Coho	H	1999	Present
Lewis River Hatchery Type N Coho	H	1995	U
Kalama River Hatchery Type N Coho	H	1999	U
Elochoman Hatchery Type N Coho	H	1999	U

The Washougal Hatchery “Type N” coho came from the Washougal River beginning in 1987 to the present with the exception in 1993 when Lewis River stock “Type N” coho was used as a supplement to the Washougal shortfall. Acceptable stocks were from any lower river “Type N” coho. The stock used most often for the 2,500,000 smolt program to the Klickitat River for supplementing the Washougal needs is the Lewis River “Type N”. These stocks originally originated from the Cowlitz “Late” stock coho (Type N) and were introduced to the Washougal Hatchery in 1985. Prior to 1985, the Washougal coho program was "Early" stock coho (Type S) with history from the Washougal River beginning in 1958/59. The hatchery program began with local stocks and some imported Toutle "Early" stock coho in 1958/59. In 1985 “Late” stock coho were introduced from the Cowlitz Salmon Hatchery. Since that time most years production has been a composite of late run Washougal and Lewis River Type N Coho.

6.2.2 Annual size.

1020 adults (1% jacks) with 50/50 male to female ratio. Additional broodstock are taken for Co-op programs and for the Klickitat River off-station plants**.**

6.2.3 Past and proposed level of natural fish in the broodstock.

The level of natural fish in the returning broodstock is unknown prior to 1998 and integrated within the spawning population. Since that time only hatchery origin broodstock identified by their missing adipose fin have been used for propagation purposes. The use of natural-origin fish (adipose fin present) will be maximized in the future to allow for the integration of this program.

6.2.4 Genetic or ecological differences.

There are no known genotypic, phenotypic or behavioral differences between the hatchery and natural stocks in the Washougal drainage. The broodstock chosen displays morphological and life history traits similar to the natural population. Large numbers of coho are released from integrated programs in the Washington tributaries in the Lower Columbia province (Lewis, Cowlitz, Washougal rivers) and are expected to contribute to natural populations.

6.2.5 Reasons for choosing.

The stock has a run entry pattern and timing that provides harvest opportunities for fisheries in the sub-basin, the lower Columbia mainstem/tributaries and Washington Coast. The stock is the strength of the Columbia River contribution to the Washington coastal fisheries especially in zones 1 & 2 (Illwaco, Westport). Combination of Type N and Type S stocks provide an extended period of quality catch in both the fresh water recreational and commercial fisheries. The stock provides the fresh water commercial fishers and opportunity (timing) outside the peak fall chinook returns in the lower Columbia River. Combined with other "Type N" coho programs, they provide an extended period of quality catch in both the freshwater recreational and commercial fisheries.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

- Integrating natural spawners will represent the natural type N coho run through out the season.
- Limit out of basin transfers except in rare circumstances.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish, if identified, will be released immediately if encountered during the broodstock collection process.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults only.

7.2 Collection or sampling design

The adult collection occurs during October through December, with most of the collection of coho during early November. The collection occurs at the hatchery rack (RM 20) where fish are diverted into a fish ladder and then into an adult holding pond. Egg take is spread out over a three week period during the peak of the run. The Washougal River can and does flood over the intake and river barrier, which will provide fish opportunity to escape above the weir. The total fish that escape are in the 3 to 5% range of the run size.

Proposed Integration – Starting with 2004 brood, WDFW will be maximizing natural coho into the broodstock program from cohorts that represent the timing and distribution of natural “Type N” coho returning to the rack.

7.3 Identity.

The target population is the Washougal River "Type N" coho stock. This population is mass marked to identify them as being from hatchery origin. All “Type N” coho produced for this program are mass marked except for the index group (30,000 Ad+CWT).

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults): 1020 adults (1% jacks)

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
Planned	500	500	20	nya	nya
1990	625	509	5	nya	nya
1991	1812	1679	21	nya	nya
1992	1791	1848	20	nya	nya
1993	241	291	7	nya	nya
1994	380	351	12	nya	nya
1995	280	252	15	nya	nya
1996	431	464	30	nya	nya
1997	836	854	nya	nya	nya
1998	532	482	22	nya	nya
1999	924	727	19	nya	nya
2000	1563	1570	6	nya	nya
2001	1773	1773	1	nya	nya

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

In 2002, 715 males and 571 females of hatchery origin were released upstream of the hatchery after broodstock and carcass enhancement needs were met. In the same year, a total of 11,749 spawned carcasses and in-the-round coho were used for nutrient enhancement. Surpluses can also be re-cycled downstream for harvest opportunity, sold or donated to food banks. The Yakima Nation and Colville Tribes received 754 adults in 2002.

7.6 Fish transportation and holding methods.

No hauling is required, adult returning fish enter the adult holding pond volitionally. Pond is monitored for water temperature and dissolved oxygen levels. Due to the dropping river temperatures, fish experience less stress than early coho or chinook but formalin treatments can be used if needed.

7.7 Describe fish health maintenance and sanitation procedures applied.

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC) and WDFW's Fish Health Manual (1998) are followed. Fish health specialists make monthly visits and consult with staff. The adult holding area is separated from all other hatchery operations. All equipment and personnel use disinfection (chlorine) procedures upon entering or exiting the area. Fish treatments are rare and only for fungus control using formalin bath treatments.

7.8 Disposition of carcasses.

Carcasses can be used for nutrient enhancement, sold or donated to food banks.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

- Limit out of basin transfers except in rare circumstances.
- Coho will be collected, throughout the entire run time, from adults arriving at the rack.
- Broodstock collection and sorting procedures can quickly identify non-target listed fish if encountered

Section 8. Mating

8.1 Selection method.

Adult spawners used for program goals are chosen from each days take and, if possible, used in the aggregate as a percentage of the total eggs taken for the season that they represent. Spawning occurs once per week for 4 to 5 weeks. Mature males and females available on a given day are mated randomly. For 2002, spawn dates were 11/30, 12/7,12/14, 12/21 & 12/28.

8.2 Males.

The spawning protocol is described in the IHOT 1995 Volume III as follows; The intent is to use a spawning population of at least 500 adults. When spawning fewer than 1 million eggs in a day, the male-to-female ratio will be 1:1 for all stocks. When spawning more than one million eggs in a day, the ratio will not be less than 1 male to 3 females. Jacks are incorporated into spawning protocol at approximately 2.0% (2:100 ratio).

8.3 Fertilization.

One to one (1:1) ratio in no larger than 10 fish pools is the method of choice for fertilization.
All eggs are water hardened in an iodine solution before incubation begins. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the days end of spawning.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- Limit out of basin transfers except in rare circumstances.
- Mating cohorts are randomly selected.
- Coho will be collected through out the run time from adults arriving at the hatchery rack.
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Eggs water hardened in iodophor (1:600).

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

A total of 700,000 is the egg take goal (2004 FBD). Eggs are shipped to RSI project in Salmon Creek and SIC projects (total of 180,000 in 2003).

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1990	1608300	94.2	90.7	nya	nya	nya	89.0
1991	4451000	90.86	89.81	nya	nya	nya	92.52
1992	3598800	95.26	99.7	nya	nya	nya	78.89
1993	581300	93.89	98.67	nya	nya	nya	92.28
1994	890000	nya	96.76	nya	nya	nya	93.89
1995	436000	nya	nya	nya	nya	nya	97.91
1996	1025000	nya	95.31	nya	nya	nya	97.26
1997	2093859	nya	96.35	nya	nya	nya	91.23
1998	1734809	nya	95.63	nya	nya	nya	87.68
1999	3318129	nya	94.91	nya	nya	nya	83.54
2000	5521401	nya	93.62	nya	nya	nya	88.04
2001	6427763	nya	92.40	nya	nya	nya	nya

9.1.2 Cause for, and disposition of surplus egg takes.

Egg takes are planned according to data/information of historical egg takes at the Washougal Hatchery. BKD and viral sampling lots (60 fish lots) are conducted over the course of the season.

9.1.3 Loading densities applied during incubation.

Eggs are placed in deep troughs to the eye stage then moved to stack incubators for hatching. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. See section 5.4 for load and hatching criteria. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities.

9.1.4 Incubation conditions.

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Harmful silt and sediment is cleaned from incubation systems regularly, while eggs are monitored to determine fertilization and mortality. Incubation water is from Bob's Creek and temperature is monitored by thermograph and recorded and temperature units (TU) are tracked for embryonic development. Dissolved oxygen content is monitored and have been at acceptable levels of saturation (minimum criteria of 8 parts per million (ppm)). When using artificial substrate, vexar or bio-rings, egg densities within incubation units are reduced by 10%.

9.1.5 Ponding.

The procedures used for determining when fry are ponded include: fry are ponded based on visual inspection of the amount of yolk sac remaining, typically the yolk slit is closed to approximately 1 millimeter wide (approximately 1600 TU's) or based on (95% yolk absorption) KD factor. At this time, fry are poured into 30 gallon plastic containers (or transferred via irrigation lines) and transferred to the appropriate raceway (See HGMP Section 5.5 for raceway specifications) during the first two weeks of February.

9.1.6 Fish health maintenance and monitoring.

Staff conducts daily inspection, visual monitoring and sampling from eyed egg, fry, fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW fish health specialist. In regular monitoring, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission.

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

- IHOT and WDFW fish health guidelines are followed
- Multiple units are used in incubation
- Splash curtains can isolate stack incubators
- Temperature, dissolved oxygen and flow are monitored

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1990	1608300	94.2	90.7	nya	nya	nya	89.0
1991	4451000	90.86	89.81	nya	nya	nya	92.52
1992	3598800	95.26	99.7	nya	nya	nya	78.89
1993	581300	93.89	98.67	nya	nya	nya	92.28
1994	890000	nya	96.76	nya	nya	nya	93.89
1995	436000	nya	nya	nya	nya	nya	97.91
1996	1025000	nya	95.31	nya	nya	nya	97.26
1997	2093859	nya	96.35	nya	nya	nya	91.23
1998	1734809	nya	95.63	nya	nya	nya	87.68
1999	3318129	nya	94.91	nya	nya	nya	83.54
2000	5521401	nya	93.62	nya	nya	nya	88.04
2001	6427763	nya	92.40	nya	nya	nya	nya

9.2.2 Density and loading criteria (goals and actual levels).

The juvenile rearing density and loading guidelines used at the facility are based on: standardized agency guidelines, life-stage specific survival studies conducted at other facilities and staff experience (e.g. trial and error). IHOT standards are followed for: water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock, loading and density.

9.2.3 Fish rearing conditions.

Fish are reared on a combination of river and spring water. Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers.

9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
3/12/02	34.3	1244	2.924	nya	nya	nya
4/3	41.0	727	nya	nya	nya	nya
5/1	52.2	353	nya	nya	nya	nya
6/5	61.0	220	nya	nya	nya	nya
7/3	67.2	165	3.896	nya	nya	nya
8/7	73.9	124	nya	nya	nya	nya
9/4	83.9	84.6	nya	nya	nya	nya
10/2	98.3	52.6	4.559	nya	nya	nya
11/13	106	42.0	nya	nya	nya	nya
12/2	110	37.5	nya	nya	nya	nya
1/2/03	113	34.5	nya	nya	nya	nya
2/5	120	28.9	nya	nya	nya	nya

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Initial feeding and early rearing occurs in the incubation troughs. Ponding/feeding begins on a volitional basis when the fry are 100% at the swim-up stage. At this point very little, if any, yolk sack will be present. Fry are ponded when: a visual inspection of the amount of yolk sac remaining with the yolk slit closed to approximately 1 millimeter wide (approximately 1600 TU's) or based on (95% yolk absorption) KD factor. At this time fry are transferred to the appropriate starter raceway (See HGMP Section 5.5 for raceway specifications) during the last two weeks of March.

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
March 90-April 91	Bio-OMP	8	1.0-3.0	<. 10/gpm**	1.23
March 00-April 01	Moore Clark Nutra Plus	8	1.0-3.0	<. 10/gpm**	1.0

* Frequency of feeding decreases as fish grow from fry (hourly) to smolt (once or twice daily).
** Lbs. fed per gpm is <.10/gpm in raceways. Larger receptacles may exceed this due to an increased volume and sufficient turnover rates.

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

A fish health specialist inspects fish monthly and checks both healthy and, if present, symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted. As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Mortality is collected and disposed of at a landfill. Fish health and/or treatment reports are kept on file. IHOT fish health guidelines are followed to prevent transmission between lots of fish on site or transmission or amplification to or within the watershed. Eggs brought to the facility are surface-disinfected with iodophor. All equipment (nets, boots, etc.) are disinfected between different fish/egg lots and different fish/egg lots are physically isolated from each other. This is done to prevent the horizontal spread of pathogens by splashing. Tank trucks are disinfected between the hauling of juvenile fish.

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, a leaner condition factor (K), a silvery physical appearance, loss of parr markings and loose scales during feeding events are signs of smolt development. Multiple smolt events can also be triggered by environmental cues including daylight increase, a spike in the water temperature and spring freshets.

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

NA

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

- Limit out of basin transfers except in rare circumstances.
- At least 500 adults are available in the population.
- Coho will be collected through out the run time from adults arriving at the hatchery rack.
- Protocols for population size, fish health disinfection and genetic guidelines followed.
- Eggs water hardened in iodophor (1:600).
- Multiple incubation and rearing units are used.
- Staff is available 24/7 to respond to emergencies.
- IHOT guidelines are followed for rearing, release and fish health parameters.

Section 10. Release

10.1 Proposed fish release levels.

500,000 yearling smolts at 17 fpp are released starting in May at the Washougal River Hatchery located at RKm 32.2.

10.2 Specific location(s) of proposed release(s).

Same, see above.

10.3 Actual numbers and sizes of fish released by age class through the program.

	Yearling Release		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)
1992	114200	April	18
1993	667900	April	19
1994	551272	April	20
1995	123950	May	19
1996	2000	May	18
1997	97500	May	11
1998	502935	April	14
1999	503944	April	17
2000	533023	April	16
2001	470309	April	15
2002	539620	April	17

10.4 Actual dates of release and description of release protocols.

See HGMP Section 10.3. All fish released into the Washougal River are forced from the asphalt adult holding pond. In 2003, fish were released on May 1. 2.5 million to Klickitat were transferred from 3/31 –4/9/03

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Asphalt Adult Holding Pond	100825	185	109	5.0	11225

10.5 Fish transportation procedures, if applicable.

On-station releases are not transported.

10.6 Acclimation procedures (*methods applied and length of time*).

Coho for this program are reared, acclimated, and released as smolts directly from the rearing/acclimation units at the Washougal Hatchery into the Washougal River. All production occurs with a mixture of Boyles Creek, Bob's Creek and Washougal River water giving the on-station coho release a distinct location indicator. All fish are programmed to be at smolt size before release.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

6% (30k) are adipose-fin clipped/coded-wire tagged (AD+CWT) marked as an index group for management purposes. The remainder of the production (475k) is adipose-fin clipped only (mass marked). All carcasses and trapped salmon are examined for fin clips (mark sampling) and snouts taken from fish with missing adipose and ventral fins collected in carcass surveys. Lengths, sex, and scales will be randomly (biological sampling) taken from trapped adults and carcasses with the adipose fin intact and from all adipose-clipped fish recovered. Snouts from the adipose-clipped carcasses will be dissected at the WDFW Olympia office. Scale samples and coded-wire tags will be read in Olympia. This is standard procedure for all Columbia River samples collected by WDFW.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

The hatchery manager would contact the complex manager who would contact the regional manager to apprise him/her of the situation. The regional manager would consult with appropriate regional co-managers/NOAA Fisheries to get recommendation for fish disposition. The hatchery complex manager would then instruct hatchery to implement recommendation(s). The program broodstock collection goal set forth in the annual Future Brood Document (FBD) usually prevents surpluses.

10.9 Fish health certification procedures applied pre-release.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease. Prior to this examination, whenever abnormal behavior or mortality is observed, staff also contacts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy and IHOT guidelines.

10.10 Emergency release procedures in response to flooding or water system failure.

Emergency procedures and disposition of fish would adhere to the protocols and procedures set forth in approved operation plans. If the program were threatened by ecological or mechanical events, the Complex Manager would contact and inform regional management of the situation. Based on a determination of a partial or complete emergency release of program fish, if an on-station emergency release was authorized, personnel would pull screens and sumps and fish would be force released into the Washougal River. No release of fish will occur without a review by WDFW Fish Management and a risk assessment is performed.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal rearing of delay in the rivers, limiting interactions with naturally produced steelhead juveniles.
- WDFW uses acclimation and release of smolts in lower river reaches where possible, this in an area below known wild fish spawning and rearing habitat.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- Mass marking allows identification of hatchery and natural coho adults.
- WDFW will be reviewing Washougal programs that drives the current release dates so that releases will occur after May 1st to minimize predation and competition on listed fish.
- WDFW fish health and operational concerns for Washougal Hatchery programs are communicated to Region 5 staff for any risk management or needed treatment. See also section 9.7.

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Refer to Section 1.10 for a discussion of how each “Performance Indicator” will be monitored and evaluated. Additional coho interaction work is being conducted on the Lewis River, which may have implications to the Washougal River. The proportion of hatchery coho on the spawning grounds is now being monitored with the start of the Mass Making Program. The Cedar Creek (Lewis River) natural fish populations are now being monitored with both an upstream migrant trap installed (1998) in the Cedar Creek Fish Way and a downstream smolt migrant (screw) trap beginning in 1998. An attempt will be made to determine the interaction of naturally spawning hatchery coho with natural spawning coho. With the ultimate goal of determining if limit access of hatchery coho to the upper Cedar Creek watershed increase natural coho production. Secondly to evaluate whether a stream (coho stock) strongly impacted by the genetics of hatchery fish changes (spawn timing, etc.) over a short period of time with the exclusion of hatchery fish. Implement programs on other streams based on the data gather from the Cedar Creek evaluation. Ecological interactions between program fish and natural fish will be addressed through Cedar Creek monitoring and evaluation measures proposed and further investigations of coho smolt residuals (emigration rates and release sites) and fall chinook predation by hatchery coho smolts in the Lewis River.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

To evaluate hatchery programs comprehensive monitoring and evaluation programs are needed. These programs at a minimum must measure adult hatchery and wild escapement, and fishery contributions from hatchery and wild salmonids for every stock. Reproductive success should be measured for representative wild and hatchery stocks. Ecological interactions (predation, competition, and disease) need to be measured for representative stocks as well. With the loss of Mitchell Act funding, staffing and logistical support may be lost to continue the monitoring and evaluation of this and other programs on the Columbia River. Current Fish program staff is available to complete baseline monitoring and evaluation needs while research is on-going for coho interaction in the Lewis River.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities. Most trap mortalities are the result of extreme environmental conditions that flood traps, or equipment failure. WDFW will take precautions to make sure the equipment is properly functioning during the season. If environmental conditions are forecast that will cause high mortality then traps will be removed or opened up to allow unobstructed passage without mortality. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Section 12. Research

12.1 Objective or purpose.

No research is conducted for this program.

12.2 Cooperating and funding agencies.

12.3 Principle investigator or project supervisor and staff.

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

12.6 Dates or time periods in which research activity occurs.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8 Expected type and effects of take and potential for injury or mortality.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

12.10 Alternative methods to achieve project objects.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Fall Chinook

ESU/Population	Lower Columbia River Fall Chinook
Activity	Washougal Type N Coho Program
Location of hatchery activity	Washougal River Hatchery
Dates of activity	November – January
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0 – 10* (unk)	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	0	nya
Unintentional lethal take (g)	nya	nya	0-2**	nya
Other take (specify) (h)	nya	nya	nya	nya

- Late Chinook enter the trap during the coho trapping season. The fall Chinook program has ended at this time. As fall Chinook are not mass marked, the identity is unknown.
- ** Pond mortality from Chinook that cannot be identified without mass marking.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

Take Table 2. Estimated listed salmonid take levels by hatchery activity.

Chum

ESU/Population	Lower Columbia River Chum
Activity	Washougal Type N Coho Program
Location of hatchery activity	Washougal River Hatchery
Dates of activity	November – January
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	0	nya
Unintentional lethal take (g)	nya	nya	0	nya
Other take (specify) (h)	nya	nya	nya	nya

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Take Table 3. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Lower Columbia River Summer Steelhead
Activity	Washougal Type N Coho Program
Location of hatchery activity	Washougal River Hatchery
Dates of activity	November – January
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0-5*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	0	nya
Unintentional lethal take (g)	nya	nya	0	nya
Other take (specify) (h)	nya	nya	nya	nya

* Natural steelhead are released from the holding pond upstream of the rack.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

Take Table 4. Estimated listed salmonid take levels by hatchery activity.

Coho (proposed)

ESU/Population	Lower Columbia River Winter Steelhead
Activity	Washougal Type N Coho Program
Location of hatchery activity	Washougal River Hatchery
Dates of activity	November -January
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya		nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	Up to 400	nya
Intentional lethal take (f)	nya	nya	Up to 400	nya
Unintentional lethal take (g)	Up to 63,000*	Up to 57,330*		nya
Other take (specify) (h)	nya	nya	nya	nya

* Based on 90% egg to fry survival and 90% fry to smolt survival of 700,000 eggs.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category